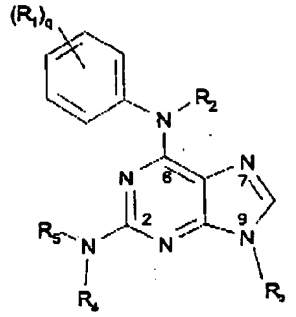
CLAIMS

Claims 1-24 (canceled).

CLAIMS

25. (new) A compound of the formula I



(I)

wherein

q is 1-5,

R_1 is

α) $-S(=O)_k-NR_6R_7$, in which

k is 1 or 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; hydrogen or lower aliphatic acyl; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula $-NH-S(=O)_i-R_6$, in which

i is 1 or 2,

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula -NH-C(=O)-R_9, in which

R_9 is alkoxy, aryloxy, alkenyl, alkynyl, heterocyclyl alkynyl, aryl alkynyl, heteroaryl alkynyl, alkynyloxy or aryl alkynyloxy, which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, phenyl, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_9 radical has not more than 20 C atoms;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen, carbamoyl or N-lower alkyl-carbamoyl,

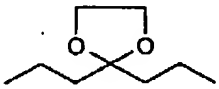
R_3 is lower alkyl, which is unsubstituted or substituted by hydroxy, lower alkoxy, amino, lower alkylamino or N,N-di-lower alkylamino and

a) R_4 is hydrogen, amino, phenylamino, lower alkylamino, hydroxyl, phenoxy, lower alkoxy, acyl having 1-30 C atoms, a carbocyclic or carbocyclic-aliphatic radical having not more than 29 C atoms, a heterocyclic or heterocyclic-aliphatic radical having not more than 20 C atoms and not more than 9 heteroatoms, or a substituted hydrocarbon radical having not more than 29 C atoms wherein the substituents are selected from halogen, amino, lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, benzoylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, phenyloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, carbamoyl, amidino, cyano, lower alkoxy, phenyloxy, aminocarbonyl-oxy, oxo, aminosulfonyl, lower alkylsulfonyl-amino, glycylamino, alanylamino, phenylalanylamino, prolylamino, valylamino, leucylamino, isoleucylamino, serylamino, threonylamino, cysteinylamino, methionylamino, tyrosylamino, tryptophanylamino, arginylamino, histidylamino, lysylamino, glutamylamino, glutaminylamino, asparagylamino, asparaginylamino and phenylglycylamino; and

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen, or

b) R_4 and R_5 together are 1,2-ethylene, propane-1,3-diyl, butane-1,4-diyl, pentane-1,5-diyl, 3-(3-amino-propionyl)-3-aza-pentane-1,5-diyl, 2-amino-butane-1,4-diyl, 1-aminomethyl-butane-1,4-diyl, 1-hydroxymethyl-butane-1,4-diyl, 3-hydroxy-pentane-1,5-diyl, 1-hydroxy-hexane-1,5-diyl, 3-(2-amino-ethyl)-pentane-1,5-diyl, 3-aza-pentane-1,5-diyl (-CH_2-CH_2-NH-CH_2-CH_2-), 3-aza-2,4-dimethyl-pentane-1,5-diyl (-CH_2-CH[CH_3]-NH-CH[CH_3]-CH_2-), 3-amino-3-

aza-pentane-1,5-diyl (-CH_2-CH_2-N[NH_2]-CH_2-CH_2-), 1-aza-pentane-1,5-diyl, 1-aza-1-toluylaminocarbonyl-pentane-1,5-diyl, 1-aza-1-(methylamino-thiocarbonyl)-pentane-1,5-diyl, 1-aza-1-(tert-butylamino-carbonyl)-p ntane-1,5-diyl, 1-aza-1-(cyclohexylamino-carbonyl)-pentane-1,5-diyl, 3-aza-1-hydroxy-heptane-3,7-diyl, 3-aza-1-cyano-heptane-3,7-diyl, 1-amino-3-aza-heptane-3,7-diyl, 3-(2-amino-ethyl)-3-aza-pentane-1,5-diyl (-CH_2-CH_2-N[-CH_2-CH_2-NH_2]-CH_2-CH_2-), 1-carbamoyl-butane-1,4-diyl, 2-formylamino-pentane-1,4-diyl, 2-aza-butadiene-1,4-diyl (-CH=CH-N=CH-), 2-aza-3-hydroxymethyl-butadiene-1,4-diyl (-CH=C[CH_2OH]-N=CH-) or a radical of the formula



in which the two terminal bonds of the alkylene chain are free valencies,

wherein in the above definitions

an aliphatic radical is an unsubstituted or substituted alkyl, alkenyl or alkynyl radical having not more than 20 C atoms which alkenyl or alkynyl radicals are mono- or polyunsaturated and a substituted aliphatic radical carries one or more identical or different radicals selected from halogen, amino, lower alkylamino, di-lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, aroylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, aryloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, thio, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, aryloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, aminoacyl-amino, carbamoyl, amidino, cyano, hydroxy, lower alkoxy, aryloxy, aminocarbonyl-oxy, oxo, aminosulfonyl and lower alkylsulfonyl-amino;

or a salt thereof

wherein hydrocarbon is either: 1) an acyclic, carbocyclic, or carbocyclic-acyclic radical having no more than 29 carbon atoms, or 2) an acyclic, carbocyclic, or carbocyclic-acyclic radical interrupted by one or more identical or different heteroatoms selected from oxygen, sulfur, and nitrogen having a total of no more than 29 C, O, S, and N atoms.

26. (new) A compound of claim 25 of formula I, wherein

q is 1-5,

R_1 is

α) -S(=O)$_k$-NR_6R_7, in which

k is 1 or 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; hydrogen or lower aliphatic acyl; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula $-NH-S(=O)_i-R_8$, in which

i is 1 or 2,

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula $-NH-C(=O)-R_9$, in which

R_9 is alkoxy, aryloxy, alkenyl, alkynyl, aryl alkynyl, alkynyloxy or aryl alkynyloxy, which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, phenyl, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_9 radical has not more than 20 C atoms;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen, carbamoyl or N-lower alkyl-carbamoyl,

R_3 is lower alkyl, which is unsubstituted or substituted by hydroxy, lower alkoxy, amino, lower alkylamino or N,N-di-lower alkylamino and

a) R_4 is hydrogen, amino, phenylamino, lower alkylamino, hydroxyl, phenoxy, lower alkoxy, acyl having 1-30 C atoms, a carbocyclic or carbocyclic-aliphatic radical having not more than 29 C atoms, a heterocyclic or heterocyclic-aliphatic radical having not more than 20 C atoms and not more than 9 heteroatoms, or a substituted hydrocarbon radical having not more than 29 C atoms wherein the substituents are selected from halogen, amino, lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, benzoylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, phenyloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-

amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, carbamoyl, amidino, cyano, lower alkoxy, phenyloxy, aminocarbonyl-oxy, oxo, aminosulfonyl, lower alkylsulfonyl-amino, glycylamino, alanylamino, phenylalanylamino, prolylamino, valylamino, leucylamino, isoleucylamino, serylamino, threonylamino, cysteinylamino, methionylamino, tyrosylamino, tryptophanylamino, arginylamino, histidylamino, lysylamino, glutamylamino, glutaminylamino, asparagylamino, asparaginylamino and phenylglycylamino; and

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen, or

b) R_4 and R_5 together are 1,2-ethylene, propane-1,3-diyl, butane-1,4-diyl, pentane-1,5-diyl, 3-(3-amino-propionyl)-3-aza-pentane-1,5-diyl, 2-amino-butane-1,4-diyl, 1-aminomethyl-butane-1,4-diyl, 1-hydroxymethyl-butane-1,4-diyl, 3-hydroxy-pentane-1,5-diyl, 1-hydroxy-hexane-1,5-diyl, 3-(2-amino-ethyl)-pentane-1,5-diyl, 3-aza-pentane-1,5-diyl ($-CH_2-CH_2-NH-CH_2-CH_2-$), 3-aza-2,4-dimethyl-pentane-1,5-diyl ($-CH_2-CH[CH_3]-NH-CH[CH_3]-CH_2-$), 3-amino-3-aza-pentane-1,5-diyl ($-CH_2-CH_2-N[NH_2]-CH_2-CH_2-$), 1-aza-pentane-1,5-diyl, 1-aza-1-toluylaminocarbonyl-pentane-1,5-diyl, 1-aza-1-(methylamino-thiocarbonyl)-pentane-1,5-diyl, 1-aza-1-(tert-butylamino-carbonyl)-pentane-1,5-diyl, 1-aza-1-(cyclohexylamino-carbonyl)-pentane-1,5-diyl, 3-aza-1-hydroxy-heptane-3,7-diyl, 3-aza-1-cyano-heptane-3,7-diyl, 1-amino-3-aza-heptane-3,7-diyl, 3-(2-amino-ethyl)-3-aza-pentane-1,5-diyl ($-CH_2-CH_2-N[-CH_2-CH_2-NH_2]-CH_2-CH_2-$), 1-carbamoyl-butane-1,4-diyl, 2-formylamino-pentane-1,4-diyl, 2-aza-butadiene-1,4-diyl (-CH=CH-N=CH-), 2-aza-3-hydroxymethyl-butadiene-1,4-diyl ($-CH=C[CH_2OH]-N=CH-$) or a radical of the formula

in which the two terminal bonds of the alkylene chain are free valencies,

or a salt thereof.

27. (new) A compound of claim 25 of formula I, wherein

q is 1-3,

R_1 is

a) $-S(=O)_k-NR_6R_7$, in which

k is 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; or hydrogen; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted having in each case including the substituents not more than 20 C atoms, the substituents being selected from halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula $-NH-S(=O)_i-R_8$, in which

i is 2, and

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula $-NH-C(=O)-R_9$, in which

R_9 is alkoxy, aryloxy, alkynyl, heterocyclyl alkynyl, aryl alkynyl, heteroaryl alkynyl, alkynyloxy or aryl alkynyloxy, which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, phenyl, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_9 radical has not more than 20 C atoms;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is

hydrogen, amino, phenylamino, lower alkylamino, hydroxyl, phenoxy or lower alkoxy; an acyl radical of the part formula Z-C(=W)-, in which W is oxygen, sulfur or imino and Z is hydrogen, hydrocarbyl R°, hydrocarbyloxy R°-O- or an amino group of the formula $R_{11}(R_{12})N-$, in which R° in each case is C_1-C_4alkyl, hydroxy-C_2-C_{14}alkyl, cyano-C_1-C_4alkyl, carboxy-C_1-C_4alkyl, C_1-C_4alkoxycarbonyl-C_1-C_4alkyl, C_3-C_7alkenyl or phenyl and R_{11} and R_{12} independently of one another are each hydrogen, lower alkyl, □-amino-lower alkyl, lower alkylsulfonyl or phenyl;

a substituted hydrocarbon radical having not more than 29 C atoms wherein the substituents are selected from halogen, amino, lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, benzoylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, phenyloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, carbamoyl, amidino, cyano, hydroxyl, lower alkoxy, phenyloxy, aminocarbonyl-oxy, oxo, aminosulfonyl, lower alkylsulfonyl-amino, glycylamino, alanylamino, phenylalanylamino, prolylamino, valylamino, leucylamino, isoleucylamino, serylamino, threonylamino, cysteinylamino, methionylamino, tyrosylamino, tryptophanylamino, arginylamino, histidylamino, lysylamino, glutamylamino, glutaminylamino, asparagylamino, asparaginylamino and phenylglycylamino;

benzyl, 2-phenyl-ethyl, 3-aminomethyl-benzyl, (1-hydroxy-cyclohex-1-yl)-methyl, (2-amino-3,5,5-trimethyl-cyclopentyl)-methyl, 1-[N-(1-carboxy-2-phenyl-ethyl)-carbamoyl]-2-carbamoyl-eth-1-yl, 1-carbamoyl-1-phenyl-methyl, 1-carbamoyl-2-(4-hydroxy-phenyl)-eth-1-yl, 1-carbamoyl-2-phenyl-eth-1-yl, 2-amino-1,2-diphenyl-eth-1-yl, 2-benzyloxycarbonyl-1-carbamoyl-eth-1-yl, 3-benzyloxycarbonyl-1-carbamoyl-prop-1-yl, 1-adamantyl-2-amino-prop-1-yl, 1-adamantyl-1-amino-prop-2-yl,

(2-furyl)-methyl, (2-tetrahydrofuryl)-methyl, 2-pyrid-2-yl-ethyl, 2-piperidino-ethyl, 2-(morpholin-4-yl)-ethyl, 2-(3-indolyl)-ethyl, 2-(4-imidazolyl)-ethyl, 1-carbamoyl-2-(β-indolyl)-eth-1-yl, 1-carbamoyl-2-imidazol-4-yl-eth-1-yl, 1-carbamoyl-2-indol-3-yl-eth-1-yl, 3-aminomethyl-oxetan-3-yl-methyl, 1-(acetoxy-imino)-1-(4-amino-2-oxa-1,3-diazol-5-yl)-methyl,

C_4-C_8cycloalkyl, which is substituted by carboxy, thiocarboxy, lower alkoxycarbonyl, hydrazinocarbonyl, hydroxaminocarbonyl, amidino, sulfamoyl, sulfanyl, halogen, cyano, formyl, amino, hydroxy, lower alkoxy, lower aliphatic acyl, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

2-aminomethyl-3,3,5-trimethyl-cyclopent-1-yl, 3-amino-adamantan-1-yl, 2-carbamoyl-bicyclo[2.2.1]hept-5-en-3-yl, 9-amino-spiro[4.4]non-1-yl,

5-amino-2-oxa-1,3-diazol-4-yl, 4-amino-thien-3-yl, 3-carbamoyl-5-(3-[2,4-dichloro-phenyl]-1-oxo-prop-2-en-1-yl)-1,2-thiazol-4-yl, 3-carbamoyl-5-(3-[4-trifluoro-phenyl]-1-oxo-prop-2-en-1-yl)-1,2-thiazol-4-yl, 4-amino-2-(4-carboxy-butyl)-tetrahydrothiophen-3-yl or 3-amino-2-(4-carboxy-butyl)-tetrahydrothiophen-4-yl, and

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen, or

R_4 and R_5 together are 1,2-ethylene, propane-1,3-diyl, butane-1,4-diyl, pentane-1,5-diyl, 3-(3-amino-propionyl)-3-aza-pentane-1,5-diyl, 1-aminomethyl-butane-1,4-diyl, 1-hydroxy-methyl-butane-1,4-diyl, 3-(2-amino-ethyl)-pentane-1,5-diyl, 3-aza-pentane-1,5-diyl or 3-(2-amino-ethyl)-3-aza-pentane-1,5-diyl,

or a salt thereof, with the exception of 6-(4-benzyloxycarbonylamino-phenyl-amino)-9-ethyl-2-(2-hydroxy-ethyl-amino)-9H-purine or a salt thereof

wherein in the above definitions hydrocarbyl is either: 1) an acyclic, carbocyclic, or carbocyclic-acyclic radical having no more than 29 carbon atoms, or 2) an acyclic, carbocyclic, or carbocyclic-acyclic radical interrupted by one or more identical or different heteroatoms selected from oxygen, sulfur, and nitrogen having a total of no more than 29 C, O, S, and N atoms.

28. (new) A compound of claim 25 of formula I, wherein

q is 1-3,

R_1 is

α) $-S(=O)_k-NR_6R_7$, in which

k is 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; or hydrogen; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted having in each case including the substituents not more than 20 C atoms, the substituents being selected from halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula $-NH-S(=O)_i-R_8$, in which

i is 2,

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula $-NH-C(=O)-R_9$, in which

R_8 is alkoxy, phenoxy, alkynyl or aryl alkynyl which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, phenyl, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_8 radical has not more than 20 C atoms;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen or C_5-C_7 cycloalkyl, which is substituted by amino, hydroxy, lower alkoxy, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen,

or a salt thereof.

29. (new) A compound of claim 25 of formula I, wherein

q is 1-2,

R_1 is $-S(=O)_k-NR_6R_7$, in which

k is 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent

hydrogen;

C_1-C_{12} alkyl which is unsubstituted or substituted by hydroxy, lower alkoxy, halogen, amino, lower alkylamino, di-lower alkylamino, unsubstituted heteroaryl having not more than 10 carbon atoms and not more than 3 heteroatoms or aryl having not more than 14 carbon atoms which is unsubstituted or substituted by halogen, lower alkyl, lower alkoxy, phenoxy, lower alkoxycarbonyl, imidazolyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl or lower alkyl which is substituted by halogen;

C_3-C_{10} cycloalkyl which is unsubstituted or substituted by hydroxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl or lower alkylcarbamoyl;

unsubstituted heteroaryl having not more than 20 carbon atoms and not more than 3 heteroatoms;

aryl having not more than 20 carbon atoms unsubstituted or substituted by halogen, lower alkyl, lower alkoxy, phenoxy, lower alkoxycarbonyl, imidazolyl, morpholinyl, pyrrolidinyl, piperidinyl, piperazinyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl or lower alkyl which is substituted by halogen; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted having in each case including the substituents not more than 20 C atoms, the substituents being selected from halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen or C_5-C_7 cycloalkyl, which is substituted by amino, hydroxy, lower alkoxy, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen,

or a salt thereof.

30. (new) A compound of claim 25 of formula I, wherein

β) R_1 is N-(phenyl lower alkyl)carbamoyl, wherein phenyl is unsubstituted or substituted by halogen, lower alkyl, hydroxy, lower alkoxy, phenoxy, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; or

γ) R_1 is a radical of the formula $-NH-S(=O)_i-R_8$, in which

i is 2,

R_8 is

lower alkyl, lower alkyl which is substituted by halogen;

C_3-C_8 cycloalkyl, which is unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino or carbamoyl;

unsubstituted heteroaryl having not more than 20 carbon atoms and not more than 3 heteroatoms;

phenyl which is unsubstituted or substituted by halogen, lower alkyl, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; or

δ) R_1 is a radical of the formula -NH-C(=O)-R_9,

R_9 is

alkoxy, phenoxy, alkynyl, which is unsubstituted or substituted by tri(lower alkyl)silyl; heteroaryl alkynyl, wherein the heteroaryl moiety comprises one or two heteroatoms selected from the group consisting of nitrogen, sulfur and oxygen, and which radical is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; heterocyclyl alkynyl, wherein the heterocyclyl moiety comprises one or two heteroatoms selected from the group consisting of nitrogen, sulfur and oxygen, and which radical is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; or phenyl alkynyl, which is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen or C_5-C_7 cycloalkyl, which is substituted by amino, hydroxy, lower alkoxy, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen,

or a salt thereof.

31. (new) A compound of claim 25 of formula I, wherein

q is 1,

R_1 is

α) -S(=O)$_k$-NR_6R_7, in which

k is 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

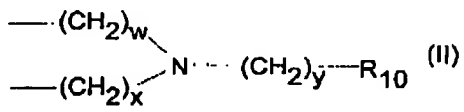
α1) R_6, R_7 can be identical or different from one another and represent hydrogen, C_1-C_8 alkyl, hydroxy lower alkyl, phenyl unsubstituted or substituted by phenoxy, lower alkoxy, imidazolyl, lower alkyl, halogen, halogen lower alkyl, lower alkyloxycarbonyl or morpholinyl; lower alkyl substituted by phenyl, halogenphenyl, naphthyl, furanyl or

pyridyl; C_3-C_8 cycloalkyl unsubstituted or substituted by hydroxy; tetrahydronaphthyl or quinolinyl; or

α2) R_6 and R_7 together are an alkylene radical

α2.1) having from 4 up to and including 6 C atoms, in which 1 C atom can be replaced by oxygen; or

α2.2) a radical of the formula (II),



(II)

in which w is 2, x is 2, y is 0 or 1 and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, trifluoromethyl or lower alkoxy,

β) unsubstituted or substituted phenyl lower alkylcarbamoyl, in which case phenyl can be substituted by halogen, lower alkyl, lower alkoxy or trifluoromethyl; or

γ) a radical of the formula -NH-S(=O)$_i$-R_8,

in which i is 2, and

R_8 is lower alkyl or phenyl substituted by lower alkyl or lower alkoxy; or

δ) a radical of the formula -NH-C(=O)-R_9, in which

R_9 is lower alkoxy, phenoxy, phenyl lower alkynyl, in which phenyl is unsubstituted or substituted by halogen, lower alkyl or lower alkoxy; lower alkynyl or tri(lower alkyl) silyl lower alkynyl,

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen, and

R_5 is cyclohexyl, which is substituted by amino, hydroxy or carbamoyl,

or a salt thereof.

32. (new) A compound of claim 25 of formula I, wherein

q is 1-3,

R_1 is

a radical of the formula -NH-C(=O)-R_9, in which R_9 is

alkoxy, phenoxy, alkynyl, which is unsubstituted or substituted by tri(lower alkyl)silyl; heteroaryl alkynyl, wherein the heteroaryl moiety is selected from the group consisting of pyridyl, pyrimidyl, thienyl, furyl, oxazolyl and thiazolyl and which radical is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl,

amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; heterocyclyl alkynyl, wherein the heterocyclyl moiety is selected from th group consisting of piperidinyl, pyrrolidinyl, piperazinyl, lower alkyl piperazinyl, morpholinyl and thiamorpholinyl, and which radical is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen; or phenyl alkynyl, which is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen or C_5-C_7 cycloalkyl, which is substituted by amino, hydroxy, lower alkoxy, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen

or a pharmaceutically acceptable salt thereof.

33. (new) A compound of claim 25 of formula I, wherein

q is 1-2,

R_1 is

a radical of the formula -NH-C(=O)-R_9, in which R_9 is

alkoxy, phenoxy, alkynyl, which is unsubstituted or substituted by tri(lower alkyl)silyl; heteroaryl alkynyl, wherein the heteroaryl moiety is selected from the group consisting of pyridyl, pyrimidyl and thienyl, and which radical is unsubstituted or substituted by lower alkyl; heterocyclyl alkynyl, wherein the heterocyclyl moiety is selected from the group consisting of piperidinyl and piperazinyl, and which radical is unsubstituted or substituted by lower alkyl; or phenyl alkynyl, which is unsubstituted or substituted by halogen, hydroxy, lower alkyl, lower alkoxy, phenyl, amino, lower alkylamino, di-lower alkylamino or lower alkyl which is substituted by halogen;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen,

R_3 is lower alkyl,

R_4 is hydrogen or C_5-C_7 cycloalkyl, which is substituted by amino, hydroxy, lower alkoxy, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, aminocarbonyloxy or ureido;

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen or a pharmaceutically acceptable salt thereof.

34. (new) A compound of claim 25 of formula I selected from the group consisting of
cis-2-[6-(4-Butyl-aminosulfonyl-phenylamino)-9-ethyl-9*H*-purin-2-yl-amino]-cyclohexanecarboxylic acid amide
cis-2-{9-Ethyl-6-[4-(3-methylbutyl)-aminosulfonyl-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanecarboxylic acid amide
cis-2-[9-Ethyl-6-(4-isobutyl-amino-sulfonyl-phenylamino)-9*H*-purin-2-yl-amino]-cyclohexanecarboxylic acid amide
cis-2-{9-Ethyl-6-[4-(4-phenyl-piperazin-1-yl-sulfonyl)-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanecarboxylic acid amide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-(3-methyl-butyl)-sulfonamide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-butyl-sulfonamide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-isobutyl-sulfonamide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-cyclohexyl-sulfonamide
cis-2-[6-(4-Cyclohexyl-aminosulfonyl-phenylamino)-9-ethyl-9*H*-purin-2-yl-amino]-cyclohexanecarboxylic acid amide
N-2-(*trans*-4-Amino-cyclohexyl)-9-ethyl-*N*-6-[4-(piperidine-1-sulfonyl)-phenyl]-9*H*-purine-2,6-diamine
cis-2-{9-Ethyl-6-[4-(piperidine-1-sulfonyl)-phenyl amino]-9*H*-purin-2-yl-amino}-cyclohexanecarboxylic acid amide
cis-2-{6-[4-(*N*-Butyl-*N*-methyl-amino-sulfonyl)-phenylamino]-9-ethyl-9*H*-purin-2-yl-amino}-cyclohexanecarboxylic acid amide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-butyl-*N*-methyl-sulfonamide
cis-2-{9-Ethyl-6-[4-(*N*-methyl-*N*-phenyl-aminosulfonyl)-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanecarboxylic acid amide
4-[2-(*trans*-4-Amino-cyclohexylamino)-9-ethyl-9*H*-purin-6-yl-amino]-phenyl-*N*-methyl-*N*-phenyl-sulfonamide
N-2-(*trans*-4-Amino-cyclohexyl)-9-ethyl-*N*-6-[4-(4-phenyl-piperazine-1-sulfonyl)-phenyl]-9*H*-purine-2,6-diamine

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-*N*-isobutyl-*N*-methyl-sulfonamide

trans-4-(9-Ethyl-6-{4-[4-(4-fluoro-phenyl)-piperazine-1-sulfonyl]-phenylamino}-9*H*-purin-2-yl-amino)-cyclohexanol

trans-4-(9-Ethyl-6-{4-[4-(3-trifluoromethyl-phenyl)-piperazine-1-sulfonyl]-phenylamino}-9*H*-purin-2-yl-amino)-cyclohexanol

trans-4-(9-Ethyl-6-{4-[4-(2-methoxy-phenyl)-piperazine-1-sulfonyl]-phenylamino}-9*H*-purin-2-yl-amino)-cyclohexanol

N-Cyclohexyl-{4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl}-*N*-methyl-sulfonamide

trans-4-(9-Ethyl-6-[4-(pyrrolidine-1-sulfonyl)-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanol

trans-4-{6-[4-(Azepane-1-sulfonyl)-phenylamino]-9-ethyl-9*H*-purin-2-yl-amino}-cyclohexanol

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(4-methoxy-phenyl)-*N*-methyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(2-pyridin-2-yl-ethyl)-sulfonamide

trans-4-{6-[4-(4-Benzyl-piperazine-1-sulfonyl)-phenylamino]-9-ethyl-9*H*-purin-2-yl-amino}-cyclohexanol

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(*trans*-4-hydroxy-cyclohexyl)-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-naphthalen-1-yl-methyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-heptyl-*N*-methyl-sulfonamide

N-(3,3-Diphenyl-propyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(1-methyl-3-phenyl-propyl)-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(3-methyl-butyl)-sulfonamide

trans-4-(9-Ethyl-6-[4-(piperidine-1-sulfonyl)-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanol

N-(3-Chloro-benzyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(3-imidazol-1-yl-phenyl)-sulfonamide)

N-(3,4-Dimethoxy-phenyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(5-fluoro-2-methyl-phenyl)-sulfonamide

N-(3,5-Dimethoxy-phenyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-phenyl-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-methyl-*N*-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(5,6,7,8-tetrahydro-1-naphthyl)-sulfonamide

N-Benzyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-*N*-phenyl-sulfonamide

4-{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonylamino}-benzoic acid propyl ester

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(4-morpholin-4-yl-phenyl)-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-quinolin-3-yl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(4-phenoxy-phenyl)-sulfonamide

N-(2,4-Dimethyl-phenyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-m-tolyl-sulfonamide)

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-o-tolyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(3-trifluoromethyl-phenyl)-sulfonamide

N-(3,4-Dichloro-phenyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

N-(3-Chloro-phenyl)-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-propyl-sulfonamide

N-Butyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-methyl-sulfonamide

trans-4-{9-Ethyl-6-[4-(4-phenyl-piperazine-1-sulfonyl)-phenylamino]-9*H*-purin-2-yl-amino}-cyclohexanol

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-3-pyridylmethyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-2-furanylmethyl-sulfonamide

N-Benzyl-*N*-ethyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

N-Cyclohexyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamid

N-Cyclopropyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-(3-hydroxy-propyl)-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-isobutyl-sulfonamide

N,N-Dibutyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-octyl-sulfonamide

trans-4-{9-Ethyl-6-[4-(morpholine-4-sulfonyl)-phenyl-amino]-9*H*-purin-2-yl-amino}-cyclohexanol

trans-4-{9-Ethyl-6-[4-(4-methyl-piperazine-1-sulfonyl)-phenyl-amino]-9*H*-purin-2-yl-amino}-cyclohexanol

N-Butyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-isopropyl-sulfonamide

N-Benzyl-4-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N*-methyl-sulfonamide

4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexyl-amino)-9*H*-purin-6-yl-amino]-phenyl-*N,N*-dimethyl-sulfonamide

N-Benzyl-3-[9-ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-benzamide

3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-*N*-(4-fluoro-benzyl)-benzamide

3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-*N*-(4-methyl-benzyl)-benzamide

3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-*N*-(4-methoxy-b nzyl)-benzamide

3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-*N*-(4-trifluoromethyl-benzyl)-benzamide

N-{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclohexylamino)-9*H*-purin-6-yl-amino]-phenyl}-methane-sulfonamide

N-{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-4-methyl-benzenesulfonamide

N-{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-4-methoxy-benzenesulfonamide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-methanesulfonamide

N-{3-[9-Ethyl-2-*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-4-methyl-benzenesulfonamide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-4-methoxy-benzenesulfonamide

{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid methyl ester

{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid isobutyl ester

{4-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid phenyl ester

{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid methyl ester

{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid isobutyl ester

{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-carbamic acid phenyl ester

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-trimethylsilylpropargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-phenylpropargylic acid amide)

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-4,4-dimethyl-2-pentynylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(4-chlorophenyl)-propargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(4-fluorophenyl)-propargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-p-tolylpropargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(4-methoxyphenyl)-propargylic acid amide

3-(4-Chloro-phenyl)-propynoic acid-N- {3-[2-(4-hydroxy-cyclohexylamino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

3-p-Tolyl-propynoic acid-N-{3-[2-(4-hydroxy-cyclohexylamino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

3-(4-Methoxy-phenyl)-propynoic acid-N-{3-[2-(4-hydroxy-cyclohexyl-amino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

3-(4-Fluoro-phenyl)-propynoic acid-N-{3-[2-(4-hydroxy-cyclohexylamino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

3-(Phenyl)-propynoic acid-N-{3-[2-(4-hydroxy-cyclohexylamino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

Biphenyl-4-carboxylic acid-N-{3-[2-(4-hydroxy-cyclohexylamino)-9-isopropyl-9*H*-purin-6-ylamino]-phenyl}-amide

3-m-Tolyl-propynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

3-(3-Trifluoromethyl-phenyl)-propynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

4,4-Dimethyl-pent-2-ynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

3-(6-Methyl-pyridin-2-yl)-propynoic acid-N- {3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

3-(4-Methyl-pyrimidin-2-yl)-propynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(2,6-dichlorophenyl)-propargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(2-thiophenyl)-propargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(2,5-dimethyl-phenyl)-propargylic acid amide

N-{3-[9-Ethyl-2-(*trans*-4-hydroxy-cyclo-hexylamino)-9*H*-purin-6-yl-amino]-phenyl}-3-(3,4-dimethyl-phenyl)-propargylic acid amide

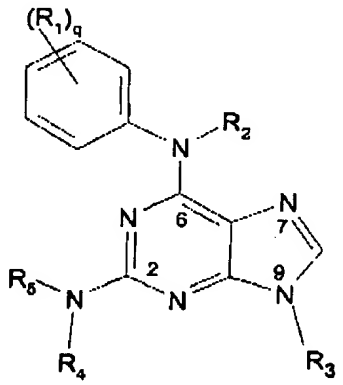
4-Piperidin-1-yl-but-2-ynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cycloh xyl-amino)-9*H*-purin-6-ylamino]-phenyl}-amide

4-(4-Methyl-piperazin-1-yl)-but-2-ynoic acid-N-{3-[9-ethyl-2-(4-hydroxy-cyclohexylamino)-9*H*-purin-6-ylamino]-phenyl}-amide

and the pharmaceutical acceptable salts thereof.

35. (new) A method of treating osteoporosis in warm-blooded animals, including humans, in which a dose which is effective against osteoporosis of a compound of claim 25 of formula I or of a pharmaceutically acceptable salt of such a compound is administered to such a warm-blooded animal suffering from osteoporosis.

36. (new) A process for the preparation of a compound of the formula I



(I)

in which q is 1-5,

R_1 is

α) $-S(=O)_k-NR_6R_7$, in which

k is 1 or 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; hydrogen or lower aliphatic acyl; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or

nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula $-NH-S(=O)_i-R_8$, in which

i is 1 or 2,

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula $-NH-C(=O)-R_9$, in which

R_9 is alkoxy, aryloxy, alkenyl, alkynyl, heterocyclyl alkynyl, aryl alkynyl, heteroaryl alkynyl, alkynyloxy or aryl alkynyloxy, which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, phenyl, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_9 radical has not more than 20 C atoms;

where, if more than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen, carbamoyl or N-lower alkyl-carbamoyl,

R_3 is lower alkyl, which is unsubstituted or substituted by hydroxy, lower alkoxy, amino, lower alkylamino or N,N-di-lower alkylamino and

a) R_4 is hydrogen, amino, phenylamino, lower alkylamino, hydroxyl, phenoxy, lower alkoxy, acyl having 1-30 C atoms, a carbocyclic or carbocyclic-aliphatic radical having not more than 29 C atoms, a heterocyclic or heterocyclic-aliphatic radical having not more than 20 C atoms and not more than 9 heteroatoms, or a substituted hydrocarbon radical having not more than 29 C atoms wherein the substituents are selected from halogen, amino, lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, benzoylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, phenyloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, carbamoyl, amidino, cyano, hydroxyl, lower alkoxy, phenyloxy, aminocarbonyl-oxy, oxo, aminosulfonyl, lower alkylsulfonyl-amino,

glycylamino, alanylamino, phenylalanylamino, prolylamino, valylamino, leucylamino, isoleucylamino, serylamino, threonylamino, cysteinylamino, methionylamino, tyrosylamino, tryptophanylamino, arginylamino, histidylamino, lysylamino, glutamylamino, glutaminylamino, asparagylamino, asparaginylamino and phenylglycylamino; and

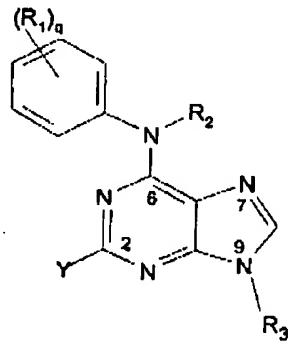
R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen, or

b) R_4 and R_5 together are 1,2-ethylene, propane-1,3-diyl, butane-1,4-diyl, pentane-1,5-diyl, 3-(3-amino-propionyl)-3-aza-pentane-1,5-diyl, 2-amino-butane-1,4-diyl, 1-aminomethyl-butane-1,4-diyl, 1-hydroxymethyl-butane-1,4-diyl, 3-hydroxy-pentane-1,5-diyl, 1-hydroxy-hexane-1,5-diyl, 3-(2-amino-ethyl)-pentane-1,5-diyl, 3-aza-pentane-1,5-diyl ($-CH_2-CH_2-NH-CH_2-CH_2-$), 3-aza-2,4-dimethyl-pentane-1,5-diyl ($-CH_2-CH[CH_3]-NH-CH[CH_3]-CH_2-$), 3-amino-3-aza-pentane-1,5-diyl ($-CH_2-CH_2-N[NH_2]-CH_2-CH_2-$), 1-aza-pentane-1,5-diyl, 1-aza-1-toluylaminocarbonyl-pentane-1,5-diyl, 1-aza-1-(methylamino-thiocarbonyl)-pentane-1,5-diyl, 1-aza-1-(tert-butylamino-carbonyl)-pentane-1,5-diyl, 1-aza-1-(cyclohexylamino-carbonyl)-pentane-1,5-diyl, 3-aza-1-hydroxy-heptane-3,7-diyl, 3-aza-1-cyano-heptane-3,7-diyl, 1-amino-3-aza-heptane-3,7-diyl, 3-(2-amino-ethyl)-3-aza-pentane-1,5-diyl ($-CH_2-CH_2-N[-CH_2-CH_2-NH_2]-CH_2-CH_2-$), 1-carbamoyl-butane-1,4-diyl, 2-formylamino-pentane-1,4-diyl, 2-aza-butadiene-1,4-diyl ($-CH=CH-N=CH-$), 2-aza-3-hydroxymethyl-butadiene-1,4-diyl ($-CH=C[CH_2OH]-N=CH-$), 2-Aza-1-hydroxy-1-(4-methoxy-phenyl-amino)-heptane-2,7-diyl $\{-(CH_2)_4-N[-CH(OH)-NH-C_6H_4-OCH_3]-\}$ or a radical of the formula

in which the two terminal bonds of the alkylene chain are free valencies,

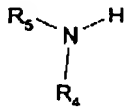
or a salt thereof, with the exception of 6-(4-benzyloxycarbonylamino-phenyl-amino)-9-ethyl-2-(2-hydroxy-ethyl-amino)-9H-purine or a salt thereof, which comprises

a) for the manufacture of a compound of formula I, wherein R_1 is $-SO_kNR_6R_7$, reacting a compound of the formula III



(III)

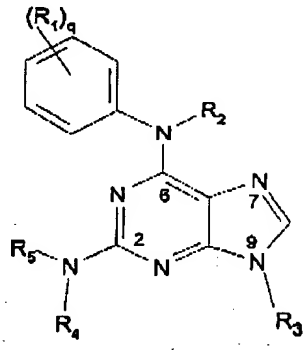
in which Y is a suitable leaving group, R_1 is $-SO_kNR_6R_7$ and the other substitu nts and symbols are as defined above for compounds of the formula I, free functional groups present in this compound, if necessary, being protected by easily detachable protective groups, with an amine of the formula IV



(IV),

in which the substituents are as defined above for compounds of the formula I, free functional groups present in this compound, if necessary, being protected by easily detachable protective groups, and detaching the protective groups present and, if necessary, converting functional groups into the final form according to formula I, or

b) for the manufacture of a compound of formula I, wherein R_1 is N-(aryl lower alkyl) carbamoyl, reacting a compound of the formula V



(V),

in which R_1 is $-CO_2H$ and the other substituents and symbols are as defined above for compounds of the formula I, free functional groups present in this compound, if necessary, being protected by easily detachable protective groups, with an aryl lower alkyl amine, free functional groups present in the aryl moiety, if necessary, being protected by easily detachable protective groups, and detaching the protective groups present, or

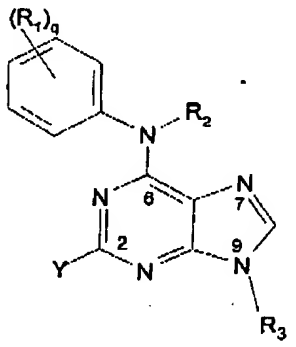
c) for the manufacture of a compound of formula I, wherein R_1 is a radical of the formula $-NH-S(=O)_l-R_8$ or of the formula $-NH-C(=O)-R_9$, reacting a compound of the formula V in which R_1 is $-NH_2$ and the other substituents and symbols are as defined above for compounds of the formula I, free functional groups present in this compound, if necessary, being protected by easily detachable protective groups, with a compound of the formula VI or VII,

R_8SO_lY (VI) or R_9COY (VII),

in which Y is a suitable leaving group and
R_8 and R_9 are as defined above for compounds of the formula I, free functional groups present in R_8 or R_9, if necessary, being protected by easily detachable protective groups,
and detaching the protective groups present,
and, after carrying out process a), b) or c), if necessary for the preparation of a salt, converting a resulting free compound of the formula I into a salt or, if necessary for preparation of a free compound, converting a resulting salt of a compound of the formula I into the free compound;
wherein in the above definitions
an aliphatic radical is an unsubstituted or substituted alkyl, alkenyl or alkynyl radical having not more than 20 C atoms which alkenyl or alkynyl radicals are mono- or polyunsaturated and a substituted aliphatic radical carries one or more identical or different radicals selected from halogen, amino, lower alkylamino, di-lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, aroylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, aryloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, thio, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, aryloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, aminoacyl-amino, carbamoyl, amidino, cyano, hydroxy, lower alkoxy, aryloxy, aminocarbonyl-oxy, oxo, aminosulfonyl and lower alkylsulfonyl-amino.

wherein hydrocarbon is either: 1) an acyclic, carbocyclic, or carbocyclic-acyclic radical having no more than 29 carbon atoms, or 2) an acyclic, carbocyclic, or carbocyclic-acyclic radical interrupted by one or more identical or different heteroatoms selected from oxygen, sulfur, and nitrogen having a total of no more than 29 C, O, S, and N atoms.

37. (new) A compound of the formula III



(III)

in which

q is 1-5

Y is a suitable leaving group,

R_1 is $-SO_2NR_6R_7$

R_2 is hydrogen, carbamoyl or N-lower alkyl-carbamoyl,

R_3 is lower alkyl, which is unsubstituted or substituted by hydroxy, lower alkoxy, amino, lower alkylamino or N,N-di-lower alkylamino;

R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; hydrogen or lower aliphatic acyl; or

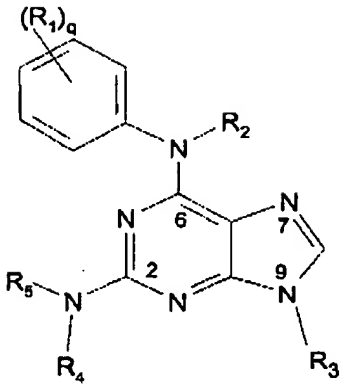
R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical $-(CH_2)_y-R_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano,

it being possible for free functional groups present therein to be protected by easily detachable protective groups, or a salt thereof;

wherein in the above definitions

an aliphatic radical is an unsubstituted or substituted alkyl, alkenyl or alkynyl radical having not more than 20 C atoms which alkenyl or alkynyl radicals are mono- or polyunsaturated and a substituted aliphatic radical carries one or more identical or different radicals selected from halogen, amino, lower alkylamino, di-lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, aroylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, aryloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, thio, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, aryloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, aminoacyl-amino, carbamoyl, amidino, cyano, hydroxy, lower alkoxy, aryloxy, aminocarbonyl-oxy, oxo, aminosulfonyl and lower alkylsulfonyl-amino.

38. (new) A compound of the formula I



(I)

wherein

q is 1-5,

R_1 is

α) -S(=O)$_k$-NR$_6$R$_7$, in which

k is 1 or 2,

wherein under the proviso that R_6 and R_7 cannot be simultaneously hydrogen

α1) R_6, R_7 can be identical or different from one another and represent an aliphatic, carbocyclic, heterocyclic, carbocyclic-aliphatic or heterocyclic-aliphatic radical; hydrogen or lower aliphatic acyl; or

α2) R_6 and R_7 together are an alkylene or alkenylene radical having from 3 up to and including 9 C atoms, in which 1-3 C atoms can be replaced by oxygen, sulfur or nitrogen, wherein said alkylene or alkenylene radical can be unsubstituted or substituted by halogen, hydroxy, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl or a radical -(CH$_2$)$_y$-R$_{10}$, in which y is 0 to 3, preferably 0 to 2, and R_{10} is hydrogen or phenyl, which is unsubstituted or substituted by halogen, halogen lower alkyl, lower alkoxy, hydroxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy or cyano, or

β) N-(aryl lower alkyl)carbamoyl, or

γ) a radical of the formula -NH-S(=O)$_i$-R$_8$, in which

i is 1 or 2,

R_8 is an aliphatic, carbocyclic or heterocyclic radical; or

δ) a radical of the formula -NH-C(=O)-R$_9$, in which

R_9 is alkoxy, aryloxy, alkenyl, alkynyl, heterocyclyl alkynyl, aryl alkynyl, heteroaryl alkynyl, alkynyloxy or aryl alkynyloxy, which in each case is unsubstituted or substituted, the substituents being selected from the group consisting of halogen, hydroxy, lower alkyl, lower alkoxy, lower alkoxycarbonyl, amino, lower alkylamino, di-lower alkylamino, carbamoyl, lower alkylcarbamoyl, carboxyl, methylenedioxy, tri-lower alkyl silyl, cyano

or lower alkyl which is substituted by halogen, wherein such an unsubstituted or substituted R_9 radical has not more than 20 C atoms;

where, if mor than one radical R_1 is present in the molecule, these can be identical or different from one another,

R_2 is hydrogen, carbamoyl or N-lower alkyl-carbamoyl,

R_3 is lower alkyl, which is unsubstituted or substituted by hydroxy, lower alkoxy, amino, lower alkylamino or N,N-di-lower alkylamino and

a) R_4 is hydrogen, amino, phenylamino, lower alkylamino, hydroxyl, phenoxy, lower alkoxy, acyl having 1-30 C atoms, a carbocyclic or carbocyclic-aliphatic radical having not more than 29 C atoms, a heterocyclic or heterocyclic-aliphatic radical having not more than 20 C atoms and not more than 9 heteroatoms, or a substituted hydrocarbon radical having not more than 29 C atoms wherein the substituents are selected from halogen, amino, lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, benzoylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, phenyloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, phenyloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, carbamoyl, amidino, cyano, hydroxyl, lower alkoxy, phenyloxy, aminocarbonyl-oxy, oxo, aminosulfonyl, lower alkylsulfonyl-amino, glycylamino, alanylamino, phenylalanylamino, prolylamino, valylamino, leucylamino, isoleucylamino, serylamino, threonylamino, cysteinylamino, methionylamino, tyrosylamino, tryptophanylamino, arginylamino, histidylamino, lysylamino, glutamylamino, glutaminylamino, asparagylamino, asparaginylamino and phenylglycylamino; and

R_5, independently of R_4, is as defined above for R_4, with the exception of hydrogen, or

b) R_4 and R_5 together are 1,2-ethylene, propane-1,3-diyl, butane-1,4-diyl, pentane-1,5-diyl, 3-(3-amino-propionyl)-3-aza-pentane-1,5-diyl, 2-amino-butane-1,4-diyl, 1-aminomethyl-butane-1,4-diyl, 1-hydroxymethyl-butane-1,4-diyl, 3-hydroxy-pentane-1,5-diyl, 1-hydroxy-hexane-1,5-diyl, 3-(2-amino-ethyl)-pentane-1,5-diyl, 3-aza-pentane-1,5-diyl (-CH_2-CH_2-NH-CH_2-CH_2-), 3-aza-2,4-dimethyl-pentane-1,5-diyl (-CH_2-CH[CH_3]-NH-CH[CH_3]-CH_2-), 3-amino-3-aza-pentane-1,5-diyl (-CH_2-CH_2-N[NH_2]-CH_2-CH_2-), 1-aza-pentane-1,5-diyl, 1-aza-1-toluylaminocarbonyl-pentane-1,5-diyl, 1-aza-1-(methylamino-thiocarbonyl)-pentane-1,5-diyl, 1-aza-1-(tert-butylamino-carbonyl)-pentane-1,5-diyl, 1-aza-1-(cyclohexylamino-carbonyl)-pentane-1,5-diyl, 3-aza-1-hydroxy-heptane-3,7-diyl, 3-aza-1-cyano-heptane-3,7-diyl, 1-amino-3-aza-heptane-3,7-diyl, 3-(2-amino-ethyl)-3-aza-pentane-1,5-diyl (-CH_2-CH_2-N[-CH_2-CH_2-NH_2]-CH_2-CH_2-), 1-carbamoyl-butane-1,4-diyl, 2-formylamino-pentane-1,4-

diyl, 2-aza-butadiene-1,4-diyl (-CH=CH-N=CH-), 2-aza-3-hydroxymethyl-butadiene-1,4-diyl (-CH=C[CH_2OH]-N=CH-) or a radical of the formula

in which the two terminal bonds of the alkylene chain are free valencies,

or a salt thereof;

wherein in the above definitions

an aliphatic radical is an unsubstituted or substituted alkyl, alkenyl or alkynyl radical having not more than 20 C atoms which alkenyl or alkynyl radicals are mono- or polyunsaturated and a substituted aliphatic radical carries one or more identical or different radicals selected from halogen, amino, lower alkylamino, di-lower alkylamino, ω-amino-lower alkylamino, lower alkanoylamino, aroylamino, hydroxylamino, hydroxylimino, lower alkoxy-amino, aryloxyamino, amino-cyclohexyl-amino-, amino-phenyl-amino-, carbamoyl-amino, (N-lower alkyl-carbamoyl)-amino, (N-[ω-amino-lower alkyl]-carbamoyl)-amino, (N-phenyl-carbamoyl)-amino, thio, lower alkylthio, thiocarbamoyl, thioureido, N-lower alkyl-thioureido, N-phenyl-thioureido, guanidino, N-lower alkyl-guanidino, carboxyl, lower alkoxycarbonyl, aryloxycarbonyl, benzyloxycarbonyl, hydroxylaminocarbonyl, aminoacyl-amino, carbamoyl, amidino, cyano, hydroxy, lower alkoxy, aryloxy, aminocarbonyl-oxy, oxo, aminosulfonyl and lower alkylsulfonyl-amino

wherein hydrocarbon is either: 1) an acyclic, carbocyclic, or carbocyclic-acyclic radical having no more than 29 carbon atoms, or 2) an acyclic, carbocyclic, or carbocyclic-acyclic radical interrupted by one or more identical or different heteroatoms selected from oxygen, sulfur, and nitrogen having a total of no more than 29 C, O, S, and N atoms.

39. (new) A pharmaceutical composition for treatment of tumors in a human which comprises an antitumorally effective amount of a compound of claim 38, or a pharmaceutically acceptable salt thereof, together with a pharmaceutically acceptable carrier.